

**Excerpt from *Louisiana Offshore Terminal Authority  
Environmental Monitoring, 2001-2002* (Barry A. Vittor &  
Associates, Inc.)**

## ABSTRACT

The current Louisiana Offshore Oil Port (LOOP) monitoring program includes seasonal monitoring of aquatic and marine resources, sediment composition, and water quality on a five (5) -year cycle. These data provide an update to the existing long-term LOOP dataset that was collected annually from 1979 to 1994, as well as a measure of natural environmental variability in the project area. The monitoring program was designed to identify environmental impacts that could occur due to offshore vessel operations (at the Single-Point Mooring and Terminal Complex), brine discharge, storage facility operations, and pipeline construction and operation. Inshore benthic samples were collected utilizing a 0.023 m<sup>2</sup> Ekman grab sampler. Five replicates were collected at each inshore Lake Jesse and Clovelly station. Offshore samples were collected with a 0.1 m<sup>2</sup> Smith-McIntyre grab sampler. There were six replicates collected at each station adjacent to the LOOP brine diffuser and seven replicates collected at each station in the area of the LOOP Marine Terminal Complex (offshore). Samples were collected during August and November 2001 and June 2002. Environmental data and hydrographic profiles were conducted in conjunction with the benthic sampling. Sediment core samples were collected at the inshore benthic stations using a Barret-type coring device. Sediment core samples collected at the offshore benthic stations were collected using a Smith-McIntyre Grab sampler. Samples were analyzed for Polynuclear Aromatic Hydrocarbons (PAH) and grain size (percent gravel, sand, silt, clay).

Sediments at the Clovelly stations during all seasons were dominated by silt+clay (except Station 464 in June). Sediments at Station 464 were greater than 20% sand during

August and November, but were completely organic during June. Estuarine salinities were present during all seasons, ranging from < 2 ppt in August to 6 ppt in June. Dissolved oxygen (DO) levels varied seasonally. DO levels were lowest in August (< 5 mg/l) and were greater than 7 mg/l during November and June. The gastropod, *Probythinella louisianae* dominated the benthic assemblage in August, the gastropod, *Amnicola limosa*, dominated in November, and the bivalve, *Mytilopsis leucophaeata*, dominated in June. There were significant differences in density and taxa richness between stations for each season. In no instance was the control station significantly different than both of the test stations. These differences could be explained by subtle variations in sediment type between stations as well as stochastic variability inherent in benthic assessments. There was no measurable impact of the LOOP facilities on benthic macroinfaunal assemblages at the Clovelly site.

Sediments at the Lake Jesse stations during all seasons were dominated by silt+clay. Estuarine salinities were present during all seasons, ranging from 4.7 ppt in August to 6.8 ppt in November. DO levels did not vary seasonally and were between 7 and 8 mg/l during all sampling events. The oligochaete family, Tubificidae (LPIL), dominated the benthic assemblage in August, the polychaete, *Mediomastus* (LPIL), dominated in November, and the ascidiacean family, Ascidiacea (LPIL), dominated the assemblage in June. There were no significant differences in density or taxa richness between stations for each season. There was no measurable impact of the LOOP facilities on benthic macroinfaunal assemblages at the Lake Jesse site.

Sediments at the Brine Diffuser stations during all seasons were dominated by silt + clay. The sediment at Station 475 in August was 45% sand. Bottom salinities varied

seasonally and were between 28-30 ppt in August, 31-32 ppt in November, and 35-36 ppt in June. Hypoxic conditions (DO = 1.88 mg/l) were present at Station 435 during August; however, DO levels at the remaining stations ranged from 2.79 mg/l at Station 473 to 3.66 mg/l at Station 475. In November, bottom DO levels ranged from 4.8 mg/l at Station 475 to 7.1 mg/l at Station 435. In June, hypoxic conditions were present at all stations with DO ranging from 1.0 mg/l at Station 475 to 1.5 mg/l at Stations 435 and 474. The polychaete, *Paraprionospio pinnata*, dominated the benthic assemblage in August and November, while the polychaete, *Mediomastus* (LPIL), dominated the benthos in June. There were no significant differences in densities between stations for each season. There were no significant differences in taxa richness between stations during August and November; in June, Station 435 had significantly greater taxa richness than the remaining stations. It is probable that the hypoxia experienced by the benthic assemblage in June was responsible for variations in taxa richness. There was no measurable impact of the LOOP facilities on benthic macroinfaunal assemblages at the Brine Diffuser site.

Sediments at the Offshore stations during all seasons were dominated by silt + clay. Bottom salinities varied seasonally and ranged from 32.4 ppt at Station 481 in August to 38.6 ppt at Station 484 in August. Hypoxic conditions were present at Stations 481 (DO = 1.60 mg/l) and 484 (DO = 1.88 mg/l) during August; no bottom DO data were collected from Station 484. In November, bottom DO levels ranged from 2.8 mg/l at Station 481 to 8.1 mg/l at Station 482. In June, bottom DO levels ranged from 6.0 mg/l at Station 482 to 6.9 mg/l at Station 484. The polychaete, *Paraprionospio pinnata*, dominated the benthic assemblage in August and June, while the gastropod, *Vitrinella helicoidea*, dominated the

## **SCOPE**

The current LOOP monitoring program includes seasonal monitoring of aquatic and marine resources, sediment composition, and water quality on a five -year cycle. These data provide an update to the existing long-term LOOP dataset that was collected annually from 1979 to 1994, as well as a measure of natural environmental variability in the project area. The monitoring program was designed to identify environmental impacts that could occur due to offshore vessel operations (at the Single-Point Mooring and Terminal Complex), brine discharge, storage facility operations, and pipeline construction and operation.

## METHODOLOGY

Vittor & Associates (BVA) conducted each study element of the monitoring program in accordance with the specifications in the previous section, using methodologies similar to the past program to ensure that proposed program data were compatible with previously collected data.

BVA's principal modifications to the present program included use of Differential Global Positioning System for sample station positioning, availability of back-up field equipment for all survey tasks, use of certified analytical laboratories for water and sediment chemistries, and use of a database management system that provides monthly data compilation/reduction.

### Biological Methods

#### Benthos

Benthic samples were collected at various inshore and offshore sample stations (Figure 1). Inshore benthic samples were collected utilizing a 0.023 m<sup>2</sup> Ekman grab sampler. Five replicates were collected at each inshore benthic station. Offshore samples were collected with a 0.1 m<sup>2</sup> Smith-McIntyre grab sampler. There were six replicates collected at each station adjacent to the LOOP brine diffuser and seven replicates collected at each station in the area of the LOOP Marine Terminal Complex (= offshore). Samples were sieved through a 0.533 mm-mesh brass screen. All material retained on the screen was preserved in a 10-15% solution of filtered ambient water and buffered formalin stained with Rose Bengal. Samples were collected during August and November 2001 and June 2002.

## **Benthic Sample Analysis**

In BVA's laboratory, benthic samples were inventoried, rinsed gently through a 0.5-mm mesh sieve to remove preservatives and sediment, stained with Rose Bengal, and stored in 70% isopropanol solution until processing. Sample material (sediment, detritus, organisms) was placed in white enamel trays for sorting under Wild M-5A dissecting microscopes. All macroinvertebrates were removed with forceps and placed in labeled glass vials containing 70% isopropanol. Each vial represented a major taxonomic group (*e.g.* Oligochaeta, Mollusca, Arthropoda). Oligochaetes were individually mounted and cleared on microscope slides prior to identification. All sorted macroinvertebrates were identified to the lowest practical identification level (LPIL), which in most cases was to species level unless the specimen was a juvenile, damaged, or otherwise unidentifiable. The number of individuals of each taxon, excluding fragments, was recorded. A voucher collection was prepared, composed of representative individuals of each species not previously encountered in samples from the Gulf of Mexico region.

## **Assemblage Analyses**

All data generated as a result of laboratory analysis of macroinfauna samples were first coded on data sheets. Enumeration data were entered for each species according to station and replicate. These data were reduced to a data summary report for each station, which included a taxonomic species list and benthic community parameters information. Documentation of BVA's standard QA/QC procedures can be seen in the Quality Assurance Plan submitted to LOTA (BVA 2001) and QA/QC results for this project are available upon request.

Several numerical indices were chosen for analysis and interpretation of the macroinfaunal data. Abundance is reported as the total number of individuals per station and the total number of individuals per square meter (= density). Taxa richness is reported as the total number of taxa represented in a given station collection. Taxa diversity, which is often related to the ecological stability and environmental “quality” of the benthos, was estimated by the Shannon-Weaver Diversity Index  $H'$  (Pielou 1966), according to the following formula:

$$H' = -\sum_{i=1}^S p_i (\ln p_i)$$

where,  $S$  = is the number of taxa in the sample,

$i$  = is the  $i^{\text{th}}$  taxon in the sample, and

$p_i$  = is the number of individuals of the  $i^{\text{th}}$  taxon divided by the total number of individuals in the sample.

Taxa diversity within a given community is dependent upon the number of taxa present (taxa richness) and the distribution of all individuals among those taxa (equitability or evenness). In order to quantify and compare the equitability in the fauna to the taxa diversity for a given area, Pielou’s Evenness Index  $J'$  (Pielou 1966) was calculated as  $J' = H' / \ln S$ , where  $\ln S = H'_{\max}$ , or the maximum possible diversity, when all taxa are represented by the same number of individuals; thus,  $J' = H' / H'_{\max}$ .

Density and taxa richness data for a given facility (Offshore Pumping Station and Single Point Mooring Complex, Brine Diffuser, Lake Jesse pipeline crossing, Clovelly Salt Domes) were graphically and statistically analyzed for potential impacts (comparisons to control stations) and seasonal differences.



## **Hydrography**

Continuous hydrographic profiles were conducted in conjunction with the benthic sampling. The following environmental data were collected at all sampling stations:

Air Temperature:	Brunton portable weather station, degrees Centigrade
Barometric Pressure:	Brunton portable weather station, mm of mercury
Wind Speed:	Brunton portable weather station, recorded in knots
Wind Direction:	Brunton portable weather station, recorded in degrees from which the wind is coming
Cloud Cover:	Visually estimated percentage of the celestial dome covered by clouds
Wave Height:	Visually estimated in meters from crest to trough
Secchi Depth:	30 cm Secchi disc lowered until no longer visible, then raised until visible and the average of two readings recorded in meters.

A HydroLab Surveyor and a Datasonde 4 were used to collect instantaneous measurements (depth, temperature, salinity, dissolved oxygen) at all monitoring stations. Continuous hydrographic profiles were collected at all offshore stations during each sampling event. The instrument was lowered by hand to discrete depths (1 meter intervals or surface, middle, and bottom) and the data recorded on field data sheets. In August 2001 there was an equipment failure at the Offshore site and a continuous profile was not captured for Station 484.

## **Sediment**

Sediment samples were collected in conjunction with benthic sampling events. Sediment core samples were collected at the inshore benthic stations using a Barret-type coring device. Sediment core samples collected at the offshore benthic stations were collected using a Smith-McIntyre Grab sampler. There were two

samples collected at each station. The samples were collected in a butyrate core tube (6.99 cm outside diameter x 6.67 inside diameter x 30.48 cm long). The interstitial pH of one sample was tested in the field with a hand-held Orion pH probe by the slurry method. One sediment sample was analyzed for Polynuclear Aromatic Hydrocarbons (PAH; Appendices I, II and III) and another was analyzed for grain size (percent gravel, sand, silt, clay).

### **Laboratory Analysis Specifications**

Water and sediment chemistry analysis USEPA methods, and method detection limits, are: Dissolved Oxygen, Method 4500-OG, 0.01 mg/L; Salinity, Method 2520-OB; Turbidity, Method 180.1, 0.1 NTU; and Sediment PAH, Method 8100. Severn Trent Laboratories (STL-Mobile) are certified for sediment PAH analysis, and used standard QA/QC procedures such as sample spikes, sample blanks, and duplicate analyses.

BVA's taxonomy laboratory conducts routine QA/QC checks for all benthic analyses, including re-analysis of 10% of all samples, use of verified reference collections, and use of outside taxonomic experts for verification of laboratory identifications.

## Brine Diffuser

### Sediment Characteristics

**August 2001.** Station location and sediment data for the Brine stations in August are given in Table 62 and Figure 14. The sediment at Station 475 was dominated by sand (45%), and the sediment at Stations 435, 473, and 474 was dominated by clay (50%, 63%, and 75 %, respectively).

**November 2001.** Station location and sediment data for the Brine stations in November are given in Table 63 and Figure 14. The sediment at all stations was dominated by the silt + clay fraction. Sand composition varied from 4% at Station 475 to 13% at Station 474.

**June 2002.** Station location and sediment data for the Brine stations in November are given in Table 64 and Figure 14. The sediment at all stations was dominated by the silt + clay fractions (99%, 94%, 95%, 80% for Stations 435, 473, 474, and 475, respectively). Sand composition varied from 0.5% at Station 435 to 20% at Station 475.

### Weather and Water Quality Data

**August 2001.** Weather condition data for the Brine stations in August are given in Table 65. Water quality data and depth profiles are provided in Tables 66, 67, 68, and 69 and Figures 15, 16, 17, and 18. Bottom temperatures ranged from 29.3 °C at Station 473 to 30.1 °C at Station 475. Hypoxic conditions were present at Station 435 (9.8 m depth; 1.88 mg/l DO). Bottom dissolved oxygen levels were above hypoxic levels at Stations 473 (9.5 m depth; 2.79 mg/l DO), 474 (9.4 m depth; 3.30 mg/l DO) and 475 (9.4 m depth; 3.66 mg/l DO). Bottom salinities were between 28 ppt and 30 ppt at the four stations.

**November 2001.** Weather condition data for the Brine stations in November are given in Table 70. Water quality data and depth profiles are provided in Tables 71, 72, 73 and 74 and Figures 15, 16, 17, and 18. The bottom temperature was 23°C at all stations. Bottom dissolved oxygen levels ranged from 4.8 mg/l at Station 475 to 7.1 mg/l at Station 435. Bottom salinities were between 31 and 32 ppt for the four stations.

**June 2002.** Weather condition data for the Brine stations in June are given in Table 75. Water quality data and depth profiles are provided in Tables 76, 77, 78, and 79 and Figures 15, 16, 17, and 18. The bottom temperature was 24.8°C for all stations. Hypoxic conditions were present at Stations 435 (9.5 and 10.1 m depth; 1.5 and 1.4 mg/l DO), 473 (9.2 and 10.4 m depth; 1.1 and 1.2 mg/l DO), 474 (8.9 and 10.5 m depth; 1.5 and 1.3 mg/l DO), and 475 (8.8 and 10.1 m depth; 1.0 and 1.2 mg/l DO). Bottom salinities were between 35 and 36 ppt at all stations.

### **Benthic Assemblage Characteristics**

**August 2001.** Twenty-eight taxa representing 1,553 individuals were collected from the Brine stations in August (Table 80). Polychaetes, gastropods and other taxa were the most numerous taxa collected representing 57%, 25%, and 14% of the total, respectively (Table 80). Polychaetes and gastropods also represented 94% and 5% of the total number of individuals collected, respectively.

Major taxonomic groups collected from the Brine stations in August are summarized by station in Table 81 and Figure 19. The distribution and abundance of individual families collected at the Brine stations are given in Table 82. Those families which made up greater than 10% of the total assemblage at a given station are listed in Table 83.

The distribution and abundance of individual taxa collected at the Brine stations in August are given in Table 84. The polychaete, *Paraprionospio pinnata*, made up 67% of the total assemblage, and several taxa were widely distributed occurring at 100% of the stations (Table 84). Those taxa which made up greater than 10% of the total assemblage at a given station are listed in Table 85.

A summary of assemblage parameters for the Brine stations in August is given in Table 86 and Figures 20, 21, 22, and 23. Mean macroinvertebrate densities ranged from 4741.7 nos/m<sup>2</sup> ( $\pm$  365) at Station 473 to 916.7 nos/m<sup>2</sup> ( $\pm$  414) at Station 474 (Figure 20). Mean number of taxa (taxa richness) ranged from 5.7 ( $\pm$  2.4) at Station 473 to 6.5 ( $\pm$  2.4 and  $\pm$  1.5, respectively) at Stations 435 and 474 (Figure 21). Diversity (H') ranged from 0.89 at Station 435 to 1.21 at Station 473 (Figure 22). Evenness (J') ranged from 0.31 at Station 435 to 0.44 at Station 473 (Figure 23). There was no significant difference in taxa richness (Table 17; F = 0.120, Prob > F = 0.895) or densities (Table 17; F = 1.441, Prob > F = 0.261) between the stations.

**November 2001.** Ninety-three taxa representing 4,048 individuals were collected from the Brine stations in November (Table 87). Polychaetes, bivalves, and gastropods were the most numerous taxa collected representing 47%, 14%, and 14% of the total, respectively (Table 87). Polychaetes, bivalves and rhynchocoels represented 69%, 10%, and 8% of the total number of individuals collected, respectively.

Major taxonomic groups collected from the Brine stations in November are summarized by station in Tables 88 and Figure 19. The distribution and abundance of individual families collected at the Brine stations are given in Table 89. Those families

which made up greater than 10% of the total assemblage at a given station are listed in Table 90.

The distribution and abundance of individual taxa collected at the Brine stations in November are given in Table 91. The polychaete, *Paraprionospio pinnata*, made up 23% of the total assemblage, and several taxa were widely distributed at 100% of the Brine stations (Table 91). Those taxa which made up greater than 10% of the total assemblage at a given station are listed in Table 92.

A summary of assemblage parameters for the Brine stations in November is given in Table 93 and Figures 20, 21, 22, and 23. Mean macroinvertebrate densities ranged from 1153.3 nos/m<sup>2</sup> ( $\pm$  566) at Station 475 to 2093.3 nos/m<sup>2</sup> ( $\pm$  668) at Station 435 (Figure 20). Mean number of taxa (taxa richness) ranged from 21.5 ( $\pm$  6.1) at Station 473 to 28.8 ( $\pm$  4.9) at Station 435 (Figure 21). Diversity ( $H'$ ) ranged from 2.62 at Station 473 to 3.07 at Station 435 (Figure 22). Evenness ( $J'$ ) ranged from 0.68 at Station 473 to 0.75 at Station 475 (Figure 23). There was no significant difference in taxa richness (Table 17;  $F = 1.779$ ,  $\text{Prob} > F = 0.184$ ) or densities (Table 17;  $F = 1.965$ ,  $\text{Prob} > F = 0.152$ ) between the stations.

**June 2002.** One hundred and fourteen taxa representing 3,791 individuals were collected from the Brine stations in June (Table 94). Polychaetes, bivalves and gastropods were the most numerous taxa collected representing 47%, 18%, and 17% of the total, respectively (Table 94). Polychaetes, bivalves and other taxa also represented 73%, 17%, and 6% of the total number of individuals collected, respectively.

Major taxonomic groups collected from the Brine stations in June are summarized by station in Tables 95 and Figure 19. The distribution and abundance of individual

families collected at the Brine stations are given in Table 96. Those families which made up greater than 10% of the total assemblage at a given station are listed in Table 97.

The distribution and abundance of individual taxa collected at the Brine stations in June are given in Table 98. The polychaete, *Mediomastus* (LPIL), made up 28% of the total assemblage, and several taxa were widely distributed occurring at 100% of the Brine stations (Table 98). Those taxa which made up greater than 10% of the total assemblage at a given station are listed in Table 99.

A summary of assemblage parameters for the Brine stations in June is given in Table 100 and Figures 20, 21, 22, and 23. Mean macroinvertebrate densities ranged from 938.3 nos/m<sup>2</sup> ( $\pm$  302) at Station 473 to 2001.7 nos/m<sup>2</sup> ( $\pm$  1096) at Station 435 (Figure 20). Mean number of taxa (taxa richness) ranged from 15.5 ( $\pm$  4.0) at Station 473 to 32.2 ( $\pm$  7.3) at Stations 435 (Figure 21). Diversity ( $H'$ ) ranged from 2.23 at Station 473 to 3.07 at Station 435 (Figure 22). Evenness ( $J'$ ) ranged from 0.57 at Station 474 to 0.71 at Station 435 (Figure 23). Control station 435 had significantly greater taxa richness than Stations 473, 474, and 475 (Table 17;  $F = 8.128$ , Prob  $>F = 0.001$ ). There were no significant difference in taxa densities (Table 17;  $F = 1.440$ , Prob  $>F = 0.261$ ) between the stations.

## Offshore Stations

### Sediment Characteristics

**August 2001.** Station location and sediment data for the Offshore stations in August are given in Table 101 and Figure 24. Clay was the dominant sediment type at all stations ( $>54\%$ ). Sand composition varied from 7% at Station 482 to 18% at Station 484.

6. There was no measurable impact of the LOOP facilities on benthic macroinfaunal assemblages at the Lake Jesse site.

### **Brine Diffuser**

1. Sediments at the Brine Diffuser stations during all seasons were dominated by silt + clay. The sediment at Station 475 in August was 45% sand.
2. Bottom salinities varied seasonally and were between 28-30 ppt in August, 31-32 ppt in November, and 35-36 ppt in June.
3. Hypoxic conditions (DO = 1.88 mg/l) were present at Station 435 during August; however, DO levels at the remaining stations ranged from 2.79 mg/l at Station 473 to 3.66 mg/l at Station 475. In November, bottom DO levels ranged from 4.8 mg/l at Station 475 to 7.1 mg/l at Station 435. In June, hypoxic conditions were present at all stations with DO ranging from 1.0 mg/l at Station 475 to 1.5 at Stations 435 and 474.
4. The polychaete *Paraprionospio pinnata* dominated the benthic assemblage in August and November, while the polychaete *Mediomastus* (LPIL) dominated the benthos in June.
5. There were no significant differences in densities between stations for each season. There were no significant differences in taxa richness between stations during August and November; in June, Station 435 had significantly greater taxa richness than the remaining stations. It is probable that the hypoxia experienced by the benthic assemblage in June was responsible for variations in taxa richness.
6. There was no measurable impact of the LOOP facilities on benthic macroinfaunal assemblages at the Brine Diffuser site.

### **Offshore Stations**

1. Sediments at the Offshore stations during all seasons were dominated by silt + clay.
2. Bottom salinities varied seasonally and ranged from 32.4 ppt at Station 481 in August to 38.6 ppt at Station 484 in August.
3. Hypoxic conditions were present at Stations 481 (DO = 1.60 mg/l) and 484 (DO = 1.88 mg/l) during August; no bottom DO data was collected from Station 484. In November, bottom DO levels ranged from 2.8 mg/l at Station 481 to 8.1 mg/l at Station 482. In June, bottom DO levels ranged from 6.0 mg/l at Station 482 to 6.9 mg/l at Station 484.



Table 80. Summary of overall abundance of major benthic macroinfauna taxonomic groups for the LOOP - Brine stations, August 2001.

<b>Taxa</b>	<b>Total No. Taxa</b>	<b>% Total</b>	<b>Total No. Individuals</b>	<b>% Total</b>
<b>Annelida</b>				
<b>Polychaeta</b>	16	57.1	1,458	93.9
<b>Mollusca</b>				
<b>Gastropoda</b>	7	25.0	83	5.3
<b>Arthropoda</b>				
<b>Malacostraca</b>	1	3.6	2	0.1
<b>Other Taxa</b>	4	14.3	10	0.6
<b>Total</b>	<b>28</b>		<b>1,553</b>	

Table 81. Summary of abundance of major benthic macroinfauna taxonomic groups by station for the LOOP - Brine stations, August 2001.

Station	Taxa	No. of Taxa	% of Total	No. of Individuals	% of Total
<b>435</b>	Annelida	11	61.1	327	90.3
	Mollusca	5	27.8	32	8.8
	Cnidaria	1	5.6	2	0.6
	Other Taxa	1	5.6	1	0.3
	<b>Total</b>	<b>18</b>		<b>362</b>	
<b>473</b>	Annelida	9	56.3	260	91.9
	Mollusca	4	25.0	18	6.4
	Arthropoda	1	6.3	1	0.4
	Other Taxa	2	12.5	4	1.4
	<b>Total</b>	<b>16</b>		<b>283</b>	
<b>474</b>	Annelida	10	66.7	530	96.4
	Mollusca	4	26.7	19	3.5
	Arthropoda	0	0.0	0	0.0
	Other Taxa	1	6.7	1	0.2
	<b>Total</b>	<b>15</b>		<b>550</b>	
<b>475</b>	Annelida	12	75.0	341	95.3
	Mollusca	1	6.3	14	3.9
	Arthropoda	1	6.3	1	0.3
	Other Taxa	2	12.5	2	0.6
	<b>Total</b>	<b>16</b>		<b>358</b>	

Table 82. Distribution and abundance of families for the LOOP - Brine stations, August 2001.

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	Station % Occurrence
Spionidae	Ann	Poly	1039	66.90	66.90	4	100
Magelonidae	Ann	Poly	324	20.86	87.77	4	100
Nassariidae	Mol	Gast	73	4.70	92.47	4	100
Pilargiidae	Ann	Poly	51	3.28	95.75	4	100
Nereidae	Ann	Poly	15	0.97	96.72	4	100
Cossuridae	Ann	Poly	10	0.64	97.36	4	100
Other Taxa	–	–	10	0.64	98.00	4	100
Goniadidae	Ann	Poly	8	0.52	98.52	3	75
Amphinomidae	Ann	Poly	5	0.32	98.84	4	100
Polynoidae	Ann	Poly	4	0.26	99.10	3	75
Naticidae	Mol	Gast	3	0.19	99.29	3	75
Vitrinellidae	Mol	Gast	3	0.19	99.48	2	50
Calypttracidae	Mol	Gast	2	0.13	99.61	2	50
Phyllodocidae	Ann	Poly	2	0.13	99.74	2	50
Pinnotheridae	Art	Mala	2	0.13	99.87	2	50
Lineidae	Rhy	Anop	1	0.06	99.94	1	25
Pyramidellidae	Mol	Gast	1	0.06	100.00	1	25

**Taxa Key**

Ann = Annelida

Art = Arthropoda

Mol = Mollusca

Poly = Polychaeta

Mala = Malacostraca

Gast = Gastropoda

Table 83. Percentage abundance of dominant families (>10% of the total) for the LOOP - Brine stations, August 2001.

Taxa	435	473	474	475
<b>Annelida</b>				
Polychaeta				
Magelonidae		30.4	16.9	37.7
Spionidae	80.7	56.9	72.9	51.7

Table 84. Distribution and abundance of taxa for the LOOP - Brine stations, August 2001.

Taxon Name	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	Station % Occurrence
<i>Paraprionospio pinnata</i>	Ann	Poly	1039	66.90	66.90	4	100
<i>Magelona</i> sp. H	Ann	Poly	324	20.86	87.77	4	100
<i>Nassarius acutus</i>	Mol	Gast	73	4.70	92.47	4	100
<i>Sigambra tentaculata</i>	Ann	Poly	32	2.06	94.53	4	100
<i>Ancistrosyllis jonesi</i>	Ann	Poly	14	0.90	95.43	4	100
<i>Laeonereis culveri</i>	Ann	Poly	10	0.64	96.07	3	75
<i>Cossura delta</i>	Ann	Poly	8	0.52	96.59	3	75
<i>Glycinde solitaria</i>	Ann	Poly	7	0.45	97.04	2	50
Actiniaria (LPIL)	Cni	Anth	5	0.32	97.36	3	75
Nereididae (LPIL)	Ann	Poly	5	0.32	97.68	3	75
<i>Paramphinome</i> sp. B	Ann	Poly	5	0.32	98.00	4	100
<i>Sigambra</i> (LPIL)	Ann	Poly	4	0.26	98.26	2	50
Polynoidae (LPIL)	Ann	Poly	3	0.19	98.45	3	75
Rhynchocoela (LPIL)	Rhy	–	3	0.19	98.65	2	50
<i>Tectonatica pusilla</i>	Mol	Gast	3	0.19	98.84	3	75
Calyptraeidae (LPIL)	Mol	Gast	2	0.13	98.97	2	50
<i>Cossura</i> (LPIL)	Ann	Poly	2	0.13	99.10	1	25
<i>Phyllodoce arenae</i>	Ann	Poly	2	0.13	99.23	2	50
<i>Pinnixa</i> (LPIL)	Art	Mala	2	0.13	99.36	2	50
Vitrinellidae (LPIL)	Mol	Gast	2	0.13	99.48	2	50
Gastropoda (LPIL)	Mol	Gast	1	0.06	99.55	1	25
<i>Lepidasthenia varia</i>	Ann	Poly	1	0.06	99.61	1	25
Lineidae (LPIL)	Rhy	Anop	1	0.06	99.68	1	25
<i>Ophioglycera</i> sp. A	Ann	Poly	1	0.06	99.74	1	25
Pyramidellidae (LPIL)	Mol	Gast	1	0.06	99.81	1	25
<i>Sigambra grubii</i>	Ann	Poly	1	0.06	99.87	1	25
Turbellaria (LPIL)	Pla	Turb	1	0.06	99.94	1	25
<i>Vitrinella helicoidea</i>	Mol	Gast	1	0.06	100.00	1	25

**Taxa Key**

Ann = Annelida                      Cni = Cnidaria                      Pla = Platyhelminthes  
Poly = Polychaeta                      Anth = Anthozoa                      Turb = Turbellaria

Art = Arthropoda                      Mol = Mollusca                      Rhy = Rhynchocoela  
Mala = Malacostraca                      Gast = Gastropoda                      Anop = Anopla

Table 85. Percentage abundance of dominant taxa (10% of the total) for the LOOP - Brine stations, August 2001.

Taxa	435	473	474	475
<b>Annelida</b>				
Polychaeta				
<i>Magelona</i> sp. H		30.4	16.9	37.7
<i>Paraprionospio pinnata</i>	80.7	56.9	72.9	51.7

Table 86. Summary of benthic macroinfaunal data for the LOOP - Brine stations, August 2001.

Station	Rep	Taxa	Indvs	Density		Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No Taxa	Total No. Individuals	H' Diversity	J' Evenness
435	A	4	54	540		6.5	2.4	603.3	427.9	18	362	0.89	0.31
	B	9	138	1380									
	C	6	53	530									
	D	5	71	710									
	E	5	31	310									
	F	10	15	150									
473	A	6	78	780		5.7	2.4	471.7	364.5	16	283	1.21	0.44
	B	6	21	210									
	C	5	11	110									
	D	4	50	500									
	E	10	102	1020									
	F	3	21	210									
474	A	5	64	640		6.5	1.5	916.7	414.2	15	550	0.96	0.36
	B	5	74	740									
	C	7	134	1340									
	D	6	33	330									
	E	7	109	1090									
	F	9	136	1360									
475	A	3	6	60	6.2	2.1	596.7	334.2	16	358	1.17	0.42	
	B	5	40	400									
	C	6	75	750									
	D	8	104	1040									
	E	6	70	700									
	F	9	63	630									

Table 87. Summary of overall abundance of major benthic macroinfauna taxonomic groups for the LOOP - Brine stations, November 2001.

<b>Taxa</b>	<b>Total No. Taxa</b>	<b>% Total</b>	<b>Total No. Individuals</b>	<b>% Total</b>
<b>Annelida</b>				
Polychaeta	44	47.3	2,793	69.0
<b>Mollusca</b>				
Bivalvia	13	14.0	413	10.2
Gastropoda	13	14.0	242	6.0
<b>Arthropoda</b>				
Malacostraca	11	11.8	125	3.1
<b>Echinodermata</b>				
Ophiuroidea	1	1.1	10	0.2
<b>Rhynchocoela</b>				
Anopla	2	2.2	312	7.7
Rhynchocoela (LPIL)	1	1.1	65	1.6
<b>Other Taxa</b>	8	8.6	88	2.2
<b>Total</b>	<b>93</b>		<b>4,048</b>	



Table 88. Summary of abundance of major benthic macroinfauna taxonomic groups by station for the LOOP - Brine stations, November 2001.

Station	Taxa	No. of Taxa	% of Total	No. of Individuals	% of Total
<b>435</b>	Annelida	34	51.5	901	71.7
	Mollusca	19	28.8	152	12.1
	Arthropoda	3	4.5	18	1.4
	Echinodermata	1	1.5	9	0.7
	Rhynchocoela	3	4.5	139	11.1
	Other Taxa	6	9.1	37	2.9
	<b>Total</b>	<b>66</b>		<b>1,256</b>	
<b>473</b>	Annelida	24	50.0	645	76.1
	Mollusca	14	29.2	105	12.4
	Arthropoda	4	8.3	18	2.1
	Echinodermata	1	2.1	1	0.1
	Rhynchocoela	3	6.3	69	8.1
	Other Taxa	2	4.2	10	1.2
	<b>Total</b>	<b>48</b>		<b>848</b>	
<b>474</b>	Annelida	28	50.0	741	59.2
	Mollusca	15	26.8	328	26.2
	Arthropoda	8	14.3	59	4.7
	Echinodermata	0	0.0	0	0.0
	Rhynchocoela	3	5.4	117	9.3
	Other Taxa	2	3.6	7	0.6
	<b>Total</b>	<b>56</b>		<b>1,252</b>	
<b>475</b>	Annelida	29	55.8	506	73.1
	Mollusca	10	19.2	70	10.1
	Arthropoda	6	11.5	30	4.3
	Echinodermata	0	0.0	0	0.0
	Rhynchocoela	3	5.8	52	7.5
	Other Taxa	4	7.7	34	4.9
	<b>Total</b>	<b>52</b>		<b>692</b>	

Table 89. Distribution and abundance of families for the LOOP - Brine stations, November 2001.

Family	Phylum	Class	Total No. Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
Spionidae	Ann	Poly	1027	25.37	25.37	4	100
Capitellidae	Ann	Poly	481	11.88	37.25	4	100
Pilargiidae	Ann	Poly	477	11.78	49.04	4	100
Magelonidae	Ann	Poly	274	6.77	55.81	4	100
Other Taxa	Art	Mala	273	6.74	62.55	4	100
Tubulanidae	Rhy	Anop	231	5.71	68.26	4	100
Semelidae	Mol	Biva	172	4.25	72.50	4	100
Ampharetidae	Ann	Poly	105	2.59	75.10	4	100
Diastylidae	Art	Mala	101	2.50	77.59	4	100
Sigalionidae	Ann	Poly	101	2.50	80.09	4	100
Nassariidae	Mol	Gast	87	2.15	82.24	4	100
Lineidae	Rhy	Anop	81	2.00	84.24	4	100
Scaphandridae	Mol	Gast	76	1.88	86.12	4	100
Ptychoderidae	Hem	Ente	71	1.75	87.87	4	100
Opheliidae	Ann	Poly	62	1.53	89.40	4	100
Amphinomidae	Ann	Poly	58	1.43	90.83	2	50
Goniadidae	Ann	Poly	58	1.43	92.27	4	100
Hesionidae	Ann	Poly	56	1.38	93.65	4	100
Mactridae	Mol	Biva	46	1.14	94.79	4	100
Vitrinellidae	Mol	Gast	30	0.74	95.53	4	100
Nereidae	Ann	Poly	29	0.72	96.25	4	100
Pyramidellidae	Mol	Gast	27	0.67	96.91	4	100
Cossuridae	Ann	Poly	21	0.52	97.43	4	100
Phyllodocidae	Ann	Poly	19	0.47	97.90	4	100
Pinnotheridae	Art	Mala	13	0.32	98.22	3	75
Naticidae	Mol	Gast	12	0.30	98.52	3	75
Tellinidae	Mol	Biva	12	0.30	98.81	3	75
Oweniidae	Ann	Poly	11	0.27	99.09	4	100
Chaetopteridae	Ann	Poly	6	0.15	99.23	3	75
Arcidae	Mol	Biva	5	0.12	99.36	2	50
Paguridae	Art	Mala	4	0.10	99.46	2	50
Nuculanidae	Mol	Biva	3	0.07	99.53	2	50
Onuphidae	Ann	Poly	3	0.07	99.60	2	50
Polynoidae	Ann	Poly	3	0.07	99.68	2	50
Aspidosiphonidae	Sip	-	1	0.02	99.70	1	25
Epitoniidae	Mol	Gast	1	0.02	99.73	1	25
Glyceridae	Ann	Poly	1	0.02	99.75	1	25
Melitidae	Art	Mala	1	0.02	99.78	1	25
Paraonidae	Ann	Poly	1	0.02	99.80	1	25
Penaeidae	Art	Mala	1	0.02	99.83	1	25
Philinidae	Mol	Gast	1	0.02	99.85	1	25
Phoronidae	Pho	-	1	0.02	99.88	1	25
Processidae	Art	Mala	1	0.02	99.90	1	25
Sipunculidae	Sip	-	1	0.02	99.93	1	25
Solenidae	Mol	Biva	1	0.02	99.95	1	25
Turridae	Mol	Gast	1	0.02	99.98	1	25
Veneridae	Mol	Biva	1	0.02	100.00	1	25

**Taxa Key**

Ann = Annelida

Poly = Polychaeta

Hem = Hemichordata

Ente = Enteropneusta

Pho = Phoronida

Rhy = Rhynchocoela

Anop = Anopla

Art = Arthropoda

Mala = Malacostraca

Mol = Mollusca

Biva = Bivalvia

Gast = Gastropoda

Sip = Sipuncula

Table 90. Percentage abundance of dominant families (>10% of the total) for LOOP - Brine stations, November 2001.

<b>Taxa</b>	<b>435</b>	<b>473</b>	<b>474</b>	<b>475</b>
<b>Annelida</b>				
Polychaeta				
Capitellidae	11.9		16.9	
Magelonidae				12.4
Pilargiidae	14.3	16.7		
Spionidae	20.8	34.6	23.0	26.7

Table 91. Distribution and abundance of taxa for the LOOP - Brine stations, November 2001.

Taxon Name	Phylum	Class	Total No. Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Paraprionospio pinnata</i>	Ann	Poly	937	23.15	23.15	4	100
<i>Mediomastus</i> (LPIL)	Ann	Poly	470	11.61	34.76	4	100
<i>Sigambra tentaculata</i>	Ann	Poly	335	8.28	43.03	4	100
<i>Magelona</i> sp. H	Ann	Poly	272	6.72	49.75	4	100
<i>Tubulanus</i> (LPIL)	Rhy	Anop	231	5.71	55.46	4	100
<i>Bivalvia</i> (LPIL)	Mol	Biva	173	4.27	59.73	4	100
<i>Ancistrosyllis jonesi</i>	Ann	Poly	120	2.96	62.70	4	100
<i>Sthenelais</i> sp. A	Ann	Poly	101	2.50	65.19	4	100
Ampharetidae (LPIL)	Ann	Poly	95	2.35	67.54	4	100
<i>Nassarius acutus</i>	Mol	Gast	87	2.15	69.69	4	100
<i>Abra</i> (LPIL)	Mol	Biva	83	2.05	71.74	1	25
Lineidae (LPIL)	Rhy	Anop	81	2.00	73.74	4	100
<i>Acteocina bidentata</i>	Mol	Gast	76	1.88	75.62	4	100
<i>Balanoglossus</i> (LPIL)	Hem	Ente	71	1.75	77.37	4	100
<i>Rhynchocoela</i> (LPIL)	Rhy	-	65	1.61	78.98	4	100
<i>Armandia maculata</i>	Ann	Poly	61	1.51	80.48	4	100
<i>Paramphinoe</i> sp. B	Ann	Poly	58	1.43	81.92	2	50
<i>Glycinde solitaria</i>	Ann	Poly	56	1.38	83.30	4	100
<i>Oxyurostylis</i> (LPIL)	Art	Mala	51	1.26	84.56	4	100
<i>Prionospio</i> (LPIL)	Ann	Poly	51	1.26	85.82	4	100
<i>Oxyurostylis lecroyae</i>	Art	Mala	50	1.24	87.06	4	100
<i>Podarkeopsis levifusca</i>	Ann	Poly	46	1.14	88.19	4	100
Semelidae (LPIL)	Mol	Biva	45	1.11	89.30	2	50
<i>Abra aequalis</i>	Mol	Biva	44	1.09	90.39	4	100
Mactridae (LPIL)	Mol	Biva	42	1.04	91.43	4	100
<i>Nereis micromma</i>	Ann	Poly	27	0.67	92.09	4	100
Spionidae (LPIL)	Ann	Poly	26	0.64	92.74	3	75
<i>Cossura delta</i>	Ann	Poly	21	0.52	93.26	4	100
<i>Odostomia weberi</i>	Mol	Gast	17	0.42	93.68	4	100
<i>Vitrinella helicoidea</i>	Mol	Gast	16	0.40	94.07	3	75
<i>Prionospio perkinsi</i>	Ann	Poly	13	0.32	94.39	2	50
<i>Phyllodoce arenae</i>	Ann	Poly	12	0.30	94.69	4	100
<i>Tectonatica pusilla</i>	Mol	Gast	12	0.30	94.99	3	75
<i>Tellina</i> (LPIL)	Mol	Biva	11	0.27	95.26	3	75
Vitrinellidae (LPIL)	Mol	Gast	11	0.27	95.53	2	50
Ophiuroidea (LPIL)	Ech	Ophi	10	0.25	95.78	2	50
<i>Pinnixa</i> (LPIL)	Art	Mala	10	0.25	96.02	3	75
Turbellaria (LPIL)	Pla	Turb	9	0.22	96.25	3	75
Gastropoda (LPIL)	Mol	Gast	7	0.17	96.42	2	50
<i>Owenia fusiformis</i>	Ann	Poly	7	0.17	96.59	4	100
<i>Phyllodoce</i> (LPIL)	Ann	Poly	7	0.17	96.76	4	100
Genus C Hesionidae Genus C	Ann	Poly	6	0.15	96.91	1	25
<i>Hobsonia florida</i>	Ann	Poly	6	0.15	97.06	1	25
<i>Mediomastus californiensis</i>	Ann	Poly	6	0.15	97.21	2	50
<i>Sigambra</i> (LPIL)	Ann	Poly	6	0.15	97.36	4	100
<i>Sigambra pettiboneae</i>	Ann	Poly	6	0.15	97.50	3	75
<i>Spiochaetopterus oculatus</i>	Ann	Poly	6	0.15	97.65	3	75
<i>Turbonilla</i> (LPIL)	Mol	Gast	6	0.15	97.80	3	75
<i>Mediomastus ambiseta</i>	Ann	Poly	5	0.12	97.92	1	25
<i>Sigambra grubii</i>	Ann	Poly	5	0.12	98.05	4	100
Arcidae (LPIL)	Mol	Biva	4	0.10	98.15	2	50
<i>Galathowenia oculata</i>	Ann	Poly	4	0.10	98.25	2	50
<i>Mulinia lateralis</i>	Mol	Biva	4	0.10	98.34	2	50
<i>Odostomia</i> (LPIL)	Mol	Gast	4	0.10	98.44	1	25
<i>Pagurus</i> (LPIL)	Art	Mala	4	0.10	98.54	2	50
<i>Sigambra wassi</i>	Ann	Poly	4	0.10	98.64	3	75
Actiniaria (LPIL)	Cni	Anth	3	0.07	98.72	2	50
<i>Amphicteis gunneri</i>	Ann	Poly	3	0.07	98.79	2	50
<i>Cyclostremiscus pentagonus</i>	Mol	Gast	3	0.07	98.86	1	25

Table 91 continued:

Taxon Name	Phylum	Class	Total No. Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Diopatra cuprea</i>	Ann	Poly	3	0.07	98.94	2	50
Nuculanidae (LPIL)	Mol	Biva	3	0.07	99.01	2	50
Pinnotheridae (LPIL)	Art	Mala	3	0.07	99.09	2	50
Goniadidae (LPIL)	Ann	Poly	2	0.05	99.14	2	50
Hesionidae (LPIL)	Ann	Poly	2	0.05	99.18	2	50
Magelonidae (LPIL)	Ann	Poly	2	0.05	99.23	1	25
Mysidacea (LPIL)	Art	Mala	2	0.05	99.28	1	25
<i>Parahelesione luteola</i>	Ann	Poly	2	0.05	99.33	1	25
Polynoidae (LPIL)	Ann	Poly	2	0.05	99.38	2	50
<i>Anadara transversa</i>	Mol	Biva	1	0.02	99.41	1	25
<i>Ancistrosyllis hartmanae</i>	Ann	Poly	1	0.02	99.43	1	25
<i>Aricidea</i> (LPIL)	Ann	Poly	1	0.02	99.46	1	25
<i>Asabellides oculata</i>	Ann	Poly	1	0.02	99.48	1	25
<i>Aspidosiphon albus</i>	Sip	-	1	0.02	99.51	1	25
Brachiopoda (LPIL)	Bra	-	1	0.02	99.53	1	25
<i>Chione</i> sp. B	Mol	Biva	1	0.02	99.56	1	25
<i>Crypturris cerinella</i>	Mol	Gast	1	0.02	99.58	1	25
Decapoda (LPIL)	Art	Mala	1	0.02	99.60	1	25
<i>Ensis</i> (LPIL)	Mol	Biva	1	0.02	99.63	1	25
<i>Epitonium</i> (LPIL)	Mol	Gast	1	0.02	99.65	1	25
<i>Glycera americana</i>	Ann	Poly	1	0.02	99.68	1	25
<i>Lepidasthenia varia</i>	Ann	Poly	1	0.02	99.70	1	25
Melitidae (LPIL)	Art	Mala	1	0.02	99.73	1	25
<i>Nereis falsa</i>	Ann	Poly	1	0.02	99.75	1	25
<i>Nereis succinea</i>	Ann	Poly	1	0.02	99.78	1	25
Opheliidae (LPIL)	Ann	Poly	1	0.02	99.80	1	25
Penaeidae (LPIL)	Art	Mala	1	0.02	99.83	1	25
<i>Philine sagra</i>	Mol	Gast	1	0.02	99.85	1	25
<i>Phoronis</i> (LPIL)	Pho	-	1	0.02	99.88	1	25
<i>Processa</i> (LPIL)	Art	Mala	1	0.02	99.90	1	25
Sipuncula (LPIL)	Sip	-	1	0.02	99.93	1	25
<i>Sipunculus nudus</i>	Sip	-	1	0.02	99.95	1	25
Stomatopoda (LPIL)	Art	Mala	1	0.02	99.98	1	25
<i>Tellina versicolor</i>	Mol	Biva	1	0.02	100.00	1	25

**Taxa Key**

Ann = Annelida

Poly = Polychaeta

Cni = Cnidaria

Anth = Anthozoa

Mol = Mollusca

Biva = Bivalvia

Gast = Gastropoda

Rhy = Rhynchocoela

Anop = Anopla

Art = Arthropoda

Mala = Malacostraca

Ech = Echinodermata

Ophi = Ophiuroidea

Pho = Phoronida

Sip = Sipuncula

Bra = Brachiopoda

Hem = Hemichordata

Ente = Enteropneusta

Pla = Platyhelminthes

Turb = Turbellaria

Table 92. Percentage abundance of dominant taxa (>10% of the total) for the LOOP - Brine stations, November 2001.

Taxa	435	473	474	475
<b>Annelida</b>				
Polychaeta				
<i>Magelona</i> sp. H				12.4
<i>Mediomastus</i> (LPIL)	11.1		16.8	
<i>Paraprionospio pinnata</i>	17.8	34.2	21.8	21.7
<i>Sigambra tentaculata</i>	10.9			

Table 93. Summary of benthic macroinfaunal data for the LOOP - Brine stations, November 2001.

Station	Rep	Taxa	Indvs	Density		Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	Total No. Individuals	H' Diversity	J' Evenness
435	A	27	198	1980		28.8	4.9	2093.3	668.2	66	1256	3.07	0.73
	B	27	199	1990									
	C	25	120	1200									
	D	35	320	3200									
	E	35	240	2400									
	F	24	179	1790									
473	A	27	148	1480		21.5	6.1	1413.3	528.5	48	848	2.62	0.68
	B	19	88	880									
	C	31	222	2220									
	D	17	112	1120									
	E	16	96	960									
	F	19	182	1820									
474	A	30	230	2300		26.3	7.6	2086.7	1319.1	56	1252	2.87	0.71
	B	39	447	4470									
	C	28	242	2420									
	D	19	110	1100									
	E	21	114	1140									
	F	21	109	1090									
475	A	29	222	2220		23.7	4.3	1153.3	566.4	52	692	2.97	0.75
	B	24	90	900									
	C	16	60	600									
	D	23	89	890									
	E	24	104	1040									
	F	26	127	1270									

Table 94. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for the LOOP - Brine stations, June 2002.

<b>Taxa</b>	<b>Total No. Taxa</b>	<b>% of Total</b>	<b>Total No. Individuals</b>	<b>% of Total</b>
<b>Annelida</b>				
Polychaeta	53	46.5	2,754	72.6
<b>Mollusca</b>				
Bivalvia	20	17.5	636	16.8
Gastropoda	19	16.7	115	3.0
<b>Arthropoda</b>				
Malacostraca	11	9.6	43	1.1
Ostracoda	1	0.9	1	0.0
<b>Echinodermata</b>				
Ophiuroidea	2	1.8	2	0.1
<b>Other Taxa</b>	8	7.0	240	6.3
<b>Total</b>	<b>114</b>		<b>3,791</b>	



Table 95. Summary of abundance of major benthic macroinfaunal taxonomic groups by station for the LOOP - Brine stations, June 2002.

Station	Taxa	No. of Taxa	% of Total	No. of Individuals	% of Total
<b>435</b>	Annelida	30	39.5	572	47.6
	Mollusca	28	36.8	515	42.9
	Arthropoda	12	15.8	39	3.2
	Echinodermata	1	1.3	1	0.1
	Other Taxa	5	6.6	74	6.2
	<b>Total</b>	<b>76</b>		<b>1,201</b>	
<b>473</b>	Annelida	19	44.2	477	84.7
	Mollusca	17	39.5	45	8.0
	Arthropoda	0	0.0	0	0.0
	Echinodermata	0	0.0	0	0.0
	Other Taxa	7	16.3	41	7.3
	<b>Total</b>	<b>43</b>		<b>563</b>	
<b>474</b>	Annelida	32	53.3	991	84.1
	Mollusca	19	31.7	112	9.5
	Arthropoda	2	3.3	4	0.3
	Echinodermata	0	0.0	0	0.0
	Other Taxa	7	11.7	72	6.1
	<b>Total</b>	<b>60</b>		<b>1,179</b>	
<b>475</b>	Annelida	29	54.7	714	84.2
	Mollusca	18	34.0	79	9.3
	Arthropoda	1	1.9	1	0.1
	Echinodermata	1	1.9	1	0.1
	Other Taxa	4	7.5	53	6.3
	<b>Total</b>	<b>53</b>		<b>848</b>	

Table 96. Distribution and abundance of families for the LOOP - Brine stations, June 2002.

Family	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
Capitellidae	Ann	Poly	1078	28.44	28.44	4	100
Spionidae	Ann	Poly	587	15.48	43.92	4	100
Petricolidae	Mol	Biva	336	8.86	52.78	1	25
Magelonidae	Ann	Poly	290	7.65	60.43	4	100
Ampharetidae	Ann	Poly	245	6.46	66.90	4	100
Pilargiidae	Ann	Poly	200	5.28	72.17	4	100
Goniadidae	Ann	Poly	179	4.72	76.89	4	100
Tubulanidae	Rhy	Anop	121	3.19	80.08	4	100
Other Taxa	–	–	104	2.74	82.83	4	100
Arcidae	Mol	Biva	72	1.90	84.73	3	75
Nuculanidae	Mol	Biva	64	1.69	86.42	4	100
Amphinomidae	Ann	Poly	59	1.56	87.97	4	100
Lineidae	Rhy	Anop	52	1.37	89.34	4	100
Tellinidae	Mol	Biva	47	1.24	90.58	4	100
Nassariidae	Mol	Gast	39	1.03	91.61	4	100
Mactridae	Mol	Biva	30	0.79	92.40	4	100
Onuphidae	Ann	Poly	27	0.71	93.12	3	75
Semelidae	Mol	Biva	26	0.69	93.80	3	75
Columbellidae	Mol	Gast	19	0.50	94.30	4	100
Sigalionidae	Ann	Poly	17	0.45	94.75	4	100
Paguridae	Art	Mala	17	0.45	95.20	2	50
Pyramidellidae	Mol	Gast	17	0.45	95.65	4	100
Vitrinellidae	Mol	Gast	15	0.40	96.04	4	100
Cirratulidae	Ann	Poly	13	0.34	96.39	3	75
Veneridae	Mol	Biva	13	0.34	96.73	3	75
Hesionidae	Ann	Poly	12	0.32	97.05	4	100
Nereidae	Ann	Poly	10	0.26	97.31	4	100
Naticidae	Mol	Gast	10	0.26	97.57	4	100
Cossuridae	Ann	Poly	8	0.21	97.78	3	75
Scaphandridae	Mol	Gast	8	0.21	98.00	4	100
Pinnotheridae	Art	Mala	6	0.16	98.15	2	50
Lumbrineridae	Ann	Poly	5	0.13	98.29	2	50
Maldanidae	Ann	Poly	5	0.13	98.42	1	25
Xanthidae	Art	Mala	5	0.13	98.55	1	25
Phyllodocidae	Ann	Poly	4	0.11	98.65	3	75
Polynoidae	Ann	Poly	4	0.11	98.76	3	75
Terebellidae	Ann	Poly	4	0.11	98.87	2	50
Ptychoderidae	Hem	Ente	4	0.11	98.97	1	25
Terebridae	Mol	Gast	4	0.11	99.08	2	50
Golfingiidae	Sip	–	4	0.11	99.18	3	75
Nephtyidae	Ann	Poly	3	0.08	99.26	1	25
Diastylidae	Art	Mala	3	0.08	99.34	2	50
Isaeidae	Art	Mala	3	0.08	99.42	1	25
Mysidae	Art	Mala	3	0.08	99.50	1	25
Sergestidae	Art	Mala	3	0.08	99.58	1	25
Corbulidae	Mol	Biva	3	0.08	99.66	2	50
Oweniidae	Ann	Poly	2	0.05	99.71	1	25
Portunidae	Art	Mala	2	0.05	99.76	1	25
Phoronidae	Pho	–	2	0.05	99.82	2	50

Table 96 continued:

<b>Family</b>	<b>Phylum</b>	<b>Class</b>	<b>No. of Individuals</b>	<b>% of Total</b>	<b>Cumulative %</b>	<b>Station Occurrence</b>	<b>% Station Occurrence</b>
Chaetopteridae	Ann	Poly	1	0.03	99.84	1	25
Opheliidae	Ann	Poly	1	0.03	99.87	1	25
Liljeborgiidae	Art	Mala	1	0.03	99.89	1	25
Sarsiellidae	Art	Ostr	1	0.03	99.92	1	25
Amphiuridae	Ech	Ophi	1	0.03	99.95	1	25
Epitoniidae	Mol	Gast	1	0.03	99.97	1	25
Turridae	Mol	Gast	1	0.03	100.00	1	25

**Taxa Key**

Ann = Annelida

Poly = Polychaeta

Art = Arthropoda

Mala = Malacostraca

Ostr = Ostracoda

Ech = Echinodermata

Ophi = Ophiuroidea

Hem = Hemichordata

Ente = Enteropneusta

Mol = Mollusca

Biva = Bivalvia

Gast = Gastropoda

Pho = Phoronida

Rhy = Rhynchocoela

Anop = Anopla

Sip = Sipuncula

Table 97. Percentage abundance of dominant families (>10 % of the total) for the LOOP - Brine stations, June 2002.

Taxa	435	473	474	475
<b>Annelida</b>				
Polychaeta				
Capitellidae		18.3	45.2	40.3
Magelonidae			10.4	
Spionidae	11.8	41.4	10.3	10.6
<b>Mollusca</b>				
Bivalvia				
Petricolidae	28.0			

Table 98. Distribution and abundance of taxa for the LOOP - Brine stations, June 2002.

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Mediomastus</i> (LPIL)	Ann	Poly	1071	28.25	28.25	4	100
<i>Paraprionospio pinnata</i>	Ann	Poly	489	12.90	41.15	4	100
<i>Petricola pholadiformis</i>	Mol	Biva	336	8.86	50.01	1	25
<i>Magelona</i> sp. H	Ann	Poly	288	7.60	57.61	4	100
<i>Asabellides oculata</i>	Ann	Poly	245	6.46	64.07	4	100
<i>Glycinde solitaria</i>	Ann	Poly	179	4.72	68.79	4	100
<i>Tubulanus</i> (LPIL)	Rhy	Anop	121	3.19	71.99	4	100
<i>Ancistrosyllis jonesi</i>	Ann	Poly	118	3.11	75.10	4	100
<i>Sigambra tentaculata</i>	Ann	Poly	68	1.79	76.89	4	100
<i>Paramphinome</i> sp. B	Ann	Poly	59	1.56	78.45	4	100
<i>Anadara transversa</i>	Mol	Biva	59	1.56	80.01	3	75
Lineidae (LPIL)	Rhy	Anop	52	1.37	81.38	4	100
Bivalvia (LPIL)	Mol	Biva	45	1.19	82.56	4	100
<i>Nuculana concentrica</i>	Mol	Biva	41	1.08	83.65	4	100
<i>Prionospio perkinsi</i>	Ann	Poly	39	1.03	84.67	3	75
<i>Nassarius acutus</i>	Mol	Gast	39	1.03	85.70	4	100
Spionidae (LPIL)	Ann	Poly	35	0.92	86.63	4	100
Tellinidae (LPIL)	Mol	Biva	33	0.87	87.50	3	75
Rhynchocoela (LPIL)	Rhy	–	32	0.84	88.34	4	100
<i>Mulinia lateralis</i>	Mol	Biva	27	0.71	89.05	4	100
Nuculanidae (LPIL)	Mol	Biva	23	0.61	89.66	3	75
<i>Diopatra cuprea</i>	Ann	Poly	22	0.58	90.24	3	75
Turbellaria (LPIL)	Pla	Turb	20	0.53	90.77	2	50
<i>Abra aequalis</i>	Mol	Biva	16	0.42	91.19	3	75
<i>Sthenelais</i> sp. A	Ann	Poly	15	0.40	91.59	4	100
<i>Pagurus</i> (LPIL)	Art	Mala	15	0.40	91.98	2	50
<i>Anachis obesa</i>	Mol	Gast	14	0.37	92.35	2	50
<i>Dipolydora socialis</i>	Ann	Poly	11	0.29	92.64	1	25
<i>Podarkeopsis levifusca</i>	Ann	Poly	11	0.29	92.93	4	100
<i>Chione cancellata</i>	Mol	Biva	11	0.29	93.22	3	75
<i>Vitrinella helicoidea</i>	Mol	Gast	11	0.29	93.51	4	100
Semelidae (LPIL)	Mol	Biva	10	0.26	93.77	1	25
<i>Tectonatica pusilla</i>	Mol	Gast	10	0.26	94.04	4	100
<i>Prionospio</i> (LPIL)	Ann	Poly	8	0.21	94.25	2	50
<i>Tellina versicolor</i>	Mol	Biva	8	0.21	94.46	3	75
<i>Acteocina bidentata</i>	Mol	Gast	8	0.21	94.67	4	100
Arcidae (LPIL)	Mol	Biva	7	0.18	94.86	2	50
<i>Chaetozone</i> sp. D	Ann	Poly	6	0.16	95.01	2	50
<i>Nereis micromma</i>	Ann	Poly	6	0.16	95.17	3	75
<i>Pinnixa</i> (LPIL)	Art	Mala	6	0.16	95.33	2	50
<i>Anadara ovalis</i>	Mol	Biva	6	0.16	95.49	1	25
<i>Cossura delta</i>	Ann	Poly	5	0.13	95.62	3	75
<i>Sigambra wassi</i>	Ann	Poly	5	0.13	95.75	3	75
Xanthidae (LPIL)	Art	Mala	5	0.13	95.88	1	25
Actiniaria (LPIL)	Cni	Anth	5	0.13	96.02	3	75
<i>Odostomia gibbosa</i>	Mol	Gast	5	0.13	96.15	2	50
Cirratulidae (LPIL)	Ann	Poly	4	0.11	96.25	2	50
<i>Clymenella torquata</i>	Ann	Poly	4	0.11	96.36	1	25
<i>Mediomastus ambiseta</i>	Ann	Poly	4	0.11	96.47	2	50
Onuphidae (LPIL)	Ann	Poly	4	0.11	96.57	2	50
<i>Polydora cornuta</i>	Ann	Poly	4	0.11	96.68	1	25
Terebellidae (LPIL)	Ann	Poly	4	0.11	96.78	2	50
<i>Balanoglossus</i> (LPIL)	Hem	Ente	4	0.11	96.89	1	25
<i>Macoma tenta</i>	Mol	Biva	4	0.11	96.99	1	25
<i>Turbonilla conradi</i>	Mol	Gast	4	0.11	97.10	2	50
<i>Phascolion strombi</i>	Sip	–	4	0.11	97.20	3	75
<i>Chaetozone</i> (LPIL)	Ann	Poly	3	0.08	97.28	2	50
<i>Cossura soyeri</i>	Ann	Poly	3	0.08	97.36	1	25
Lumbrineridae (LPIL)	Ann	Poly	3	0.08	97.44	2	50
<i>Nephtys</i> (LPIL)	Ann	Poly	3	0.08	97.52	1	25
<i>Notomastus daueri</i>	Ann	Poly	3	0.08	97.60	1	25
<i>Sigambra</i> (LPIL)	Ann	Poly	3	0.08	97.68	2	50

Table 98 continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Sigambra pettiboneae</i>	Ann	Poly	3	0.08	97.76	2	50
<i>Americamysis</i> (LPIL)	Art	Mala	3	0.08	97.84	1	25
<i>Microprotopus raneyi</i>	Art	Mala	3	0.08	97.92	1	25
<i>Oxyurostylis lecroyae</i>	Art	Mala	3	0.08	98.00	2	50
Sergestidae (LPIL)	Art	Mala	3	0.08	98.07	1	25
Mactridae (LPIL)	Mol	Biva	3	0.08	98.15	2	50
<i>Mitrella lunata</i>	Mol	Gast	3	0.08	98.23	1	25
<i>Odostomia</i> (LPIL)	Mol	Gast	3	0.08	98.31	2	50
<i>Odostomia weberi</i>	Mol	Gast	3	0.08	98.39	2	50
<i>Teinostoma biscaynense</i>	Mol	Gast	3	0.08	98.47	1	25
<i>Terebra</i> sp. A	Mol	Gast	3	0.08	98.55	1	25
<i>Fimbriosthenelais</i> (LPIL)	Ann	Poly	2	0.05	98.60	1	25
<i>Lepidasthenia varia</i>	Ann	Poly	2	0.05	98.65	1	25
<i>Magelona</i> (LPIL)	Ann	Poly	2	0.05	98.71	1	25
Nereididae (LPIL)	Ann	Poly	2	0.05	98.76	2	50
<i>Owenia fusiformis</i>	Ann	Poly	2	0.05	98.81	1	25
<i>Phyllodoce</i> (LPIL)	Ann	Poly	2	0.05	98.87	2	50
<i>Phyllodoce arenae</i>	Ann	Poly	2	0.05	98.92	2	50
<i>Scoletoma verrilli</i>	Ann	Poly	2	0.05	98.97	2	50
Paguridae (LPIL)	Art	Mala	2	0.05	99.02	1	25
<i>Corbula contracta</i>	Mol	Biva	2	0.05	99.08	1	25
<i>Tellina</i> (LPIL)	Mol	Biva	2	0.05	99.13	2	50
Columbellidae (LPIL)	Mol	Gast	2	0.05	99.18	2	50
<i>Turbonilla</i> (LPIL)	Mol	Gast	2	0.05	99.24	2	50
<i>Phoronis</i> (LPIL)	Pho	–	2	0.05	99.29	2	50
<i>Ancistrosyllis hartmanae</i>	Ann	Poly	1	0.03	99.31	1	25
<i>Armandia maculata</i>	Ann	Poly	1	0.03	99.34	1	25
Hesionidae (LPIL)	Ann	Poly	1	0.03	99.37	1	25
<i>Kinbergonuphis</i> (LPIL)	Ann	Poly	1	0.03	99.39	1	25
<i>Lepidonotus</i> sp. A	Ann	Poly	1	0.03	99.42	1	25
Maldanidae (LPIL)	Ann	Poly	1	0.03	99.45	1	25
<i>Malmgreniella macrariae</i>	Ann	Poly	1	0.03	99.47	1	25
<i>Nereis</i> (LPIL)	Ann	Poly	1	0.03	99.50	1	25
<i>Nereis succinea</i>	Ann	Poly	1	0.03	99.53	1	25
<i>Sigambra bassi</i>	Ann	Poly	1	0.03	99.55	1	25
<i>Sigambra grubii</i>	Ann	Poly	1	0.03	99.58	1	25
<i>Spiochaetopterus oculatus</i>	Ann	Poly	1	0.03	99.60	1	25
<i>Streblospio benedicti</i>	Ann	Poly	1	0.03	99.63	1	25
<i>Listriella barnardi</i>	Art	Mala	1	0.03	99.66	1	25
Portunidae (LPIL)	Art	Mala	1	0.03	99.68	1	25
<i>Portunus gibbesii</i>	Art	Mala	1	0.03	99.71	1	25
<i>Eusarsiella texana</i>	Art	Ostr	1	0.03	99.74	1	25
Amphiuridae (LPIL)	Ech	Ophi	1	0.03	99.76	1	25
Ophiuroidea (LPIL)	Ech	Ophi	1	0.03	99.79	1	25
<i>Chione</i> (LPIL)	Mol	Biva	1	0.03	99.82	1	25
Corbulidae (LPIL)	Mol	Biva	1	0.03	99.84	1	25
Veneridae (LPIL)	Mol	Biva	1	0.03	99.87	1	25
<i>Crypturris cerinella</i>	Mol	Gast	1	0.03	99.89	1	25
<i>Epitonium</i> (LPIL)	Mol	Gast	1	0.03	99.92	1	25
Gastropoda (LPIL)	Mol	Gast	1	0.03	99.95	1	25
<i>Terebra dislocata</i>	Mol	Gast	1	0.03	99.97	1	25
Vitrinellidae (LPIL)	Mol	Gast	1	0.03	100.00	1	25

**Taxa Key**

Ann = Annelida	Ech = Echinodermata	Pho = Phoronida
Poly = Polychaeta	Ophi = Ophiuroidea	Pla = Platyhelminthes
Art = Arthropoda	Hem = Hemichordata	Turb = Turbellaria
Mala = Malacostraca	Ente = Enteropneusta	Rhy = Rhynchocoela
Ostr = Ostracoda	Mol = Mollusca	Anop = Anopla
Cni = Cnidaria	Biva = Bivalvia	Sip = Sipuncula
Anth = Anthozoa	Gast = Gastropoda	

Table 99. Percentage abundance of dominant taxa (>10% of the total) for the LOOP - Brine stations, June 2002.

Taxa	435	473	474	475
<b>Annelida</b>				
Polychaeta				
<i>Magelona</i> sp. H			10.4	
<i>Mediomastus</i> (LPIL)		18.3	44.9	40.3
<i>Paraprionospio pinnata</i>		40.9		
<b>Mollusca</b>				
Bivalvia				
<i>Petricola pholadiformis</i>	28.0			

Table 100. Summary of benthic macroinfaunal data for the LOOP - Brine stations, June 2002.

Station	Rep	Taxa	Indvs	Density	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	Total No. Individuals	H' Diversity	J' Evenness
435	A	34	141	1410	32.2	7.3	2001.7	1095.8	76	1201	3.07	0.71
	B	33	305	3050								
	C	38	216	2160								
	D	41	351	3510								
	E	24	93	930								
	F	23	95	950								
473	A	15	153	1530	15.5	4.0	938.3	302.7	43	563	2.23	0.59
	B	14	77	770								
	C	11	93	930								
	D	14	70	700								
	E	16	79	790								
	F	23	91	910								
474	A	20	151	1510	22.0	8.0	1965.0	1650.7	60	1179	2.32	0.57
	B	31	329	3290								
	C	33	457	4570								
	D	18	33	330								
	E	16	155	1550								
	F	14	54	540								
475	A	25	162	1620	21.3	2.7	1413.3	485.3	53	848	2.37	0.60
	B	20	107	1070								
	C	23	105	1050								
	D	17	125	1250								
	E	21	231	2310								
	F	22	118	1180								



Figure 19. Percent abundance of major taxonomic groups for the LOOP - Brine stations, 2001-2002.

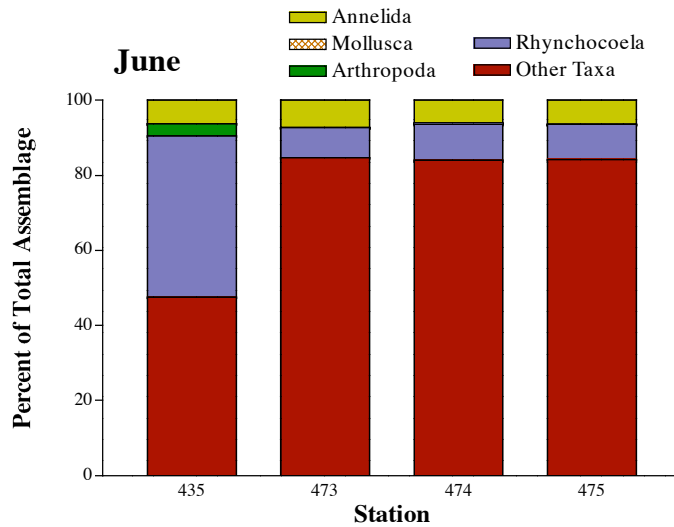
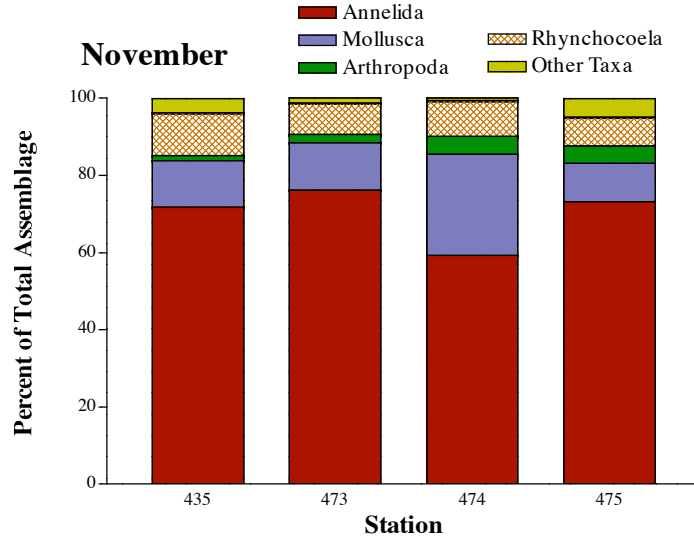
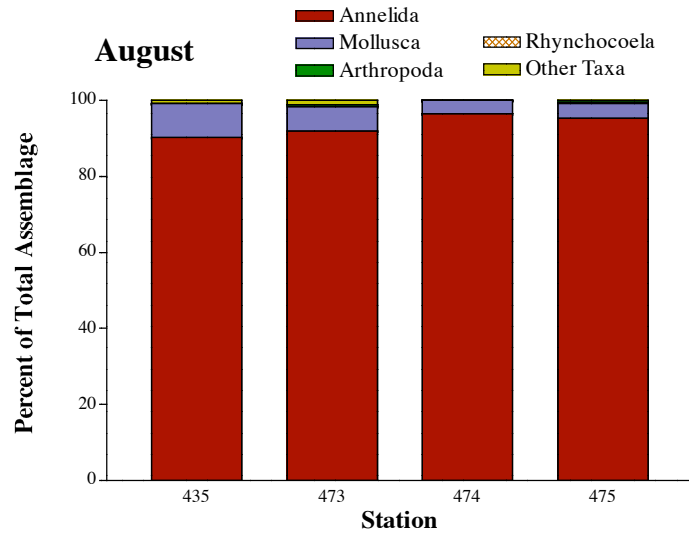


Figure 20. Macroinvertebrate density data for the LOOP - Brine stations, 2001-2002.

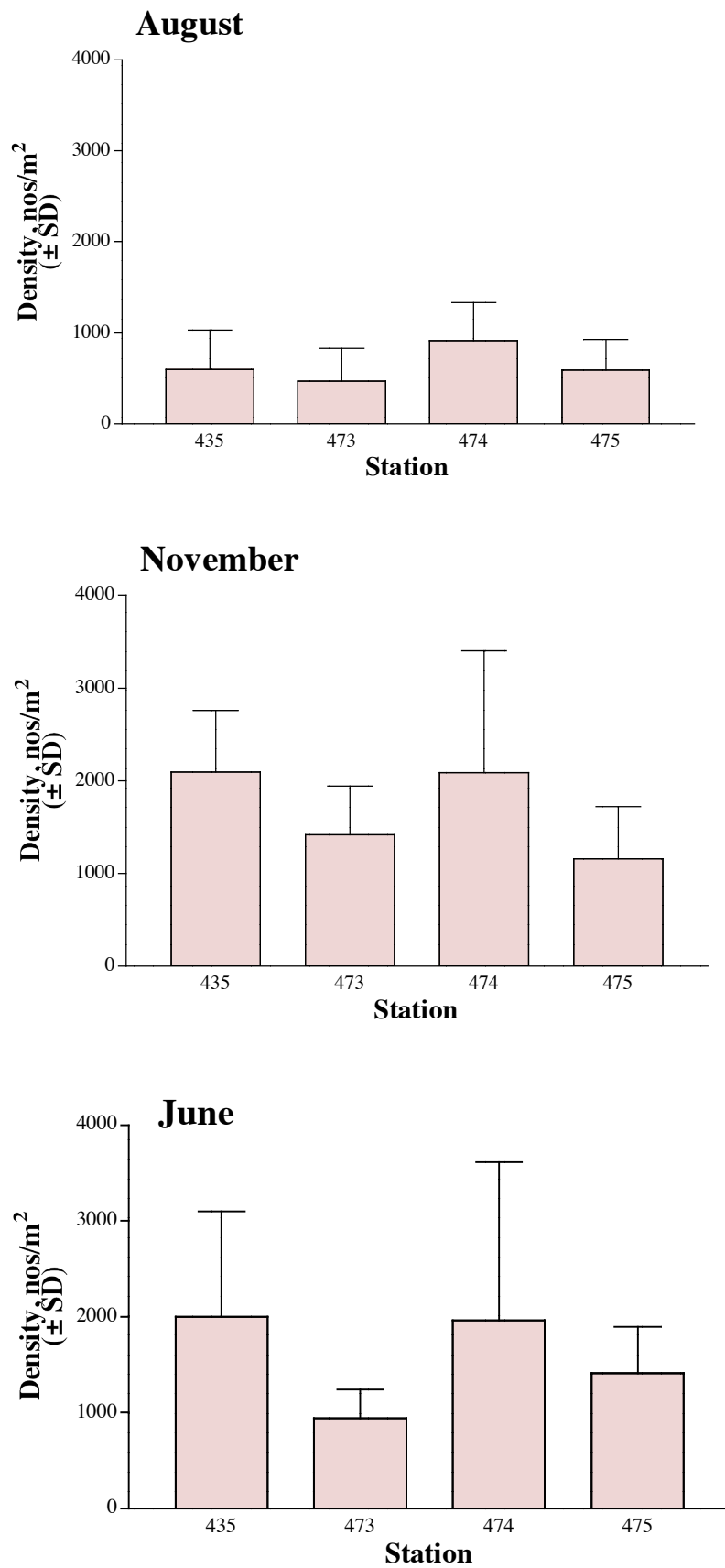


Figure 21. Taxa richness data for the LOOP - Brine stations, 2001-2002.

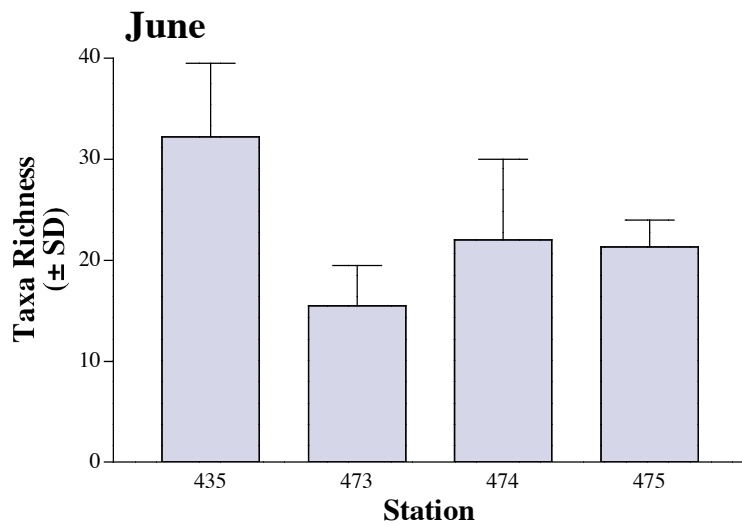
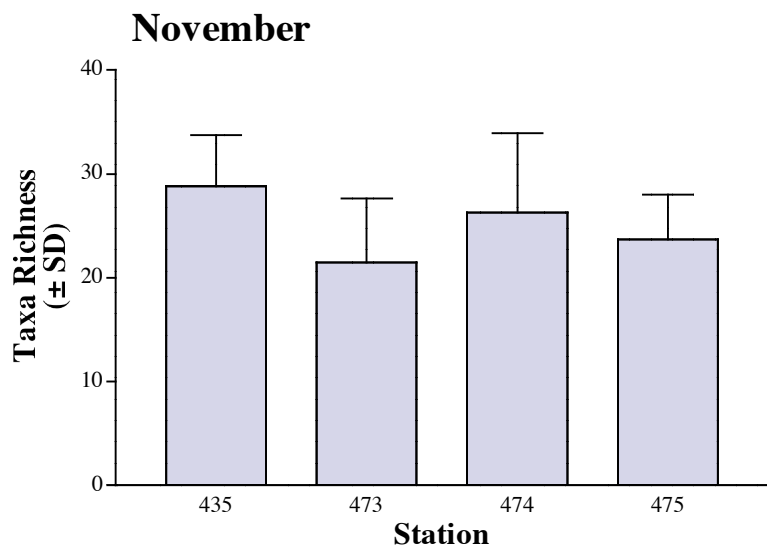
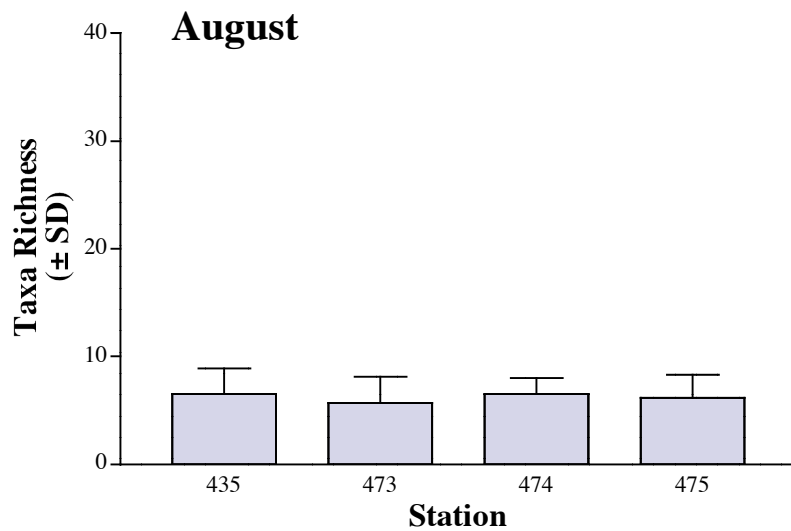


Figure 22. Taxa diversity ( $H'$ ) data for the LOOP - Brine stations, 2001-2002.

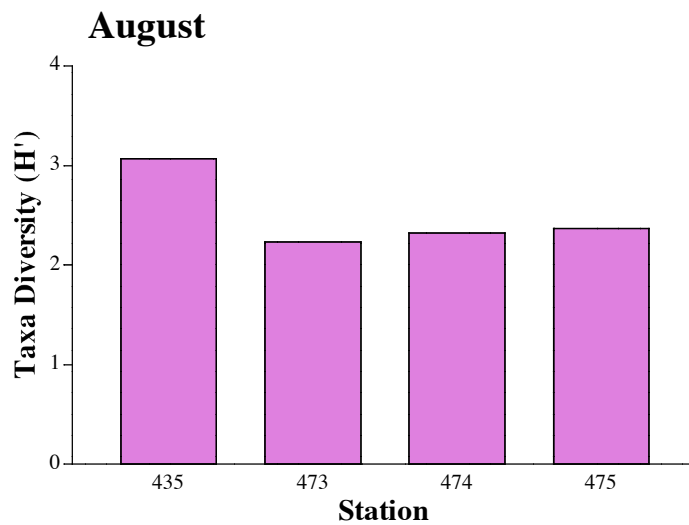
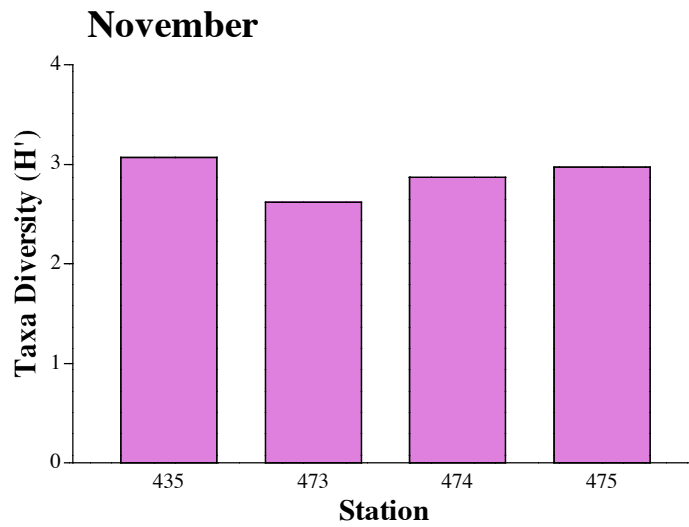
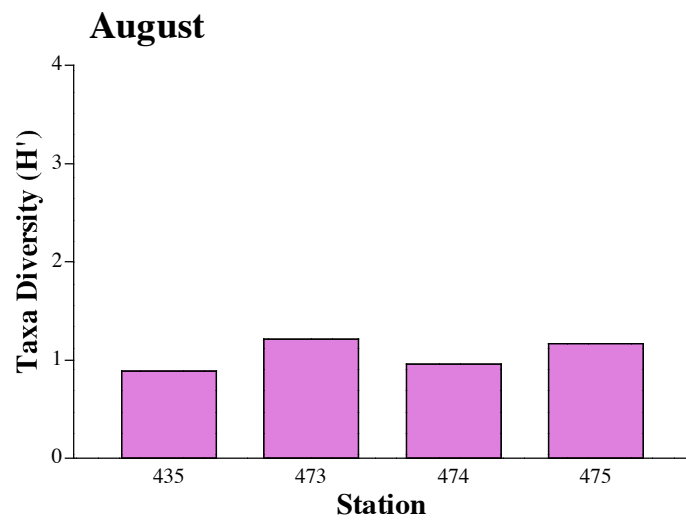


Figure 23. Taxa evenness ( $J'$ ) for the LOOP - Brine Stations, 2001-2002.

